2016
Major Automated Information System
Annual Report

Joint Space Operations Center (JSpOC) Mission System Increment 2 (JMS Inc 2)

Defense Acquisition Management
Information Retrieval
(DAMIR)

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Common Acronyms and Abbreviations for MAIS Programs

Acq O&M - Acquisition-Related Operations and Maintenance
ADM - Acquisition Decision Memorandum
AoA - Analysis of Alternatives
ATO - Authority To Operate
APB - Acquisition Program Baseline
BY - Base Year
CAE - Component Acquisition Executive
CDD - Capability Development Document
CPD - Capability Production Document
DAE - Defense Acquisition Executive
DoD - Department of Defense
DoDAF - DoD Architecture Framework
FD - Full Deployment
FDD - Full Deployment Decision
FY - Fiscal Year
IA - Information Assurance
IATO - Interim Authority to Operate
ICD - Initial Capability Document
IEA - Information Enterprise Architecture
IOC - Initial Operational Capability
IP - Internet Protocol
IT - Information Technology
KPP - Key Performance Parameter
$M - Millions of Dollars
MAIS - Major Automated Information System
MAIS OE - MAIS Original Estimate
MAR – MAIS Annual Report
MDA - Milestone Decision Authority
MDD - Materiel Development Decision
MILCON - Military Construction
MS - Milestone
N/A - Not Applicable
O&S - Operating and Support
OSD - Office of the Secretary of Defense
PB - President’s Budget
RDT&E - Research, Development, Test, and Evaluation
SAE - Service Acquisition Executive
TBD - To Be Determined
TY - Then Year
U.S.C- United States Code
USD(AT&L) - Under Secretary of Defense for Acquisition, Technology, & Logistics

Program Information

Program Name

Joint Space Operations Center (JSpOC) Mission System Increment 2 (JMS Inc 2)

DoD Component

Air Force

Responsible Office

Program Manager

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References

MAIS Original Estimate

August 29, 2013

Approved APB

Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated June 17, 2013

Program Description

The Joint Space Operations Center (JSpOC) Mission System (JMS) program will provide a Service Oriented Architecture (SOA) and net-centric collaborative information environment at the Unclassified, Secret, Top Secret/Sensitive Compartmented Information, and Special Access Program levels. Efforts incorporate net-centric enterprise services and integrated incremental space mission applications services. The priority is to transition off the legacy Space Defense Operations Center (SPADOC) hardware and services onto a more extensible and sustainable infrastructure. The effort integrates components of Space Situational Awareness (SSA) mission applications and Command and Control (C2) capabilities into the JSpOC to create timely, actionable knowledge necessary for maintaining space superiority and exercising C2 of space forces.

JMS provides a viable transition path from the legacy SPADOC system, which has 75% of its components beyond end-of-life or end-of-service, and the majority of its software is no longer vendor supported. This investment improves SSA and related support to the war fighters and civil interests by delivering systems that can handle the much greater data volume provided by modern sensors, and enables data sharing and collaboration through net-centric SOAs.

Mission applications will provide space services to enhance the accuracy, sustainability, and responsiveness of space surveillance capabilities by providing the knowledge environment necessary to enable the Commander, Joint Functional Component Command Space, to make rapid, responsive decisions for the protection of space assets from proliferating threats (adversary as well as orbiting debris). The system will provide high accuracy space catalog (knowledge of space objects), increased observation verification and capabilities, and improved processing.

JMS Increment 1 provided the foundational infrastructure, service oriented architecture, and user-defined operational picture.

JMS Increment 2 builds upon the Increment 1 technical baseline to deliver the bulk of operator and analyst capabilities required to transition off the legacy JSpOC C2 infrastructure.

JMS Increment 3 builds upon Increment 2 to deliver advanced battle management capabilities to address emerging space threats.

Business Case

Business Case Analysis, including the Analysis of Alternatives: Key functional requirements for this program were defined in the North American Aerospace Defense Command/United States Space Command Warfighting Support System Mission Need Statement, May 18, 1998 (Joint Requirements Oversight Council Memorandum (JROCM 062-98)) and the Combatant Commanders Integrated Command and Control System Operational Requirements Document, January 20, 2004 (JROCM 008-04), which serve as the ICD for Space Command and Control (C2). A Space C2 Analysis of Alternatives was completed on February 25, 2008.

The Joint Space Operations Center (JSpOC) Mission System (JMS) CDD dated December 10, 2010 (JROCM 189-10) identified the five program KPPs as:

1. User Defined Operational Picture
2. Provide High Accuracy Space Object Positional Information
3. Predict and Report Orbital Conjunctions
4. Operational Availability
5. Net-Ready

The program has been separated into multiple increments. The preferred alternative for Increment 2 was selected on December 19, 2011, per OUSD(AT&L) ADM dated December 19, 2011. JROCM 112-12, dated August 1, 2012, identified KPPs 2, 3, and 4 to be applicable to JMS Increment 2.

The Economic Analysis for the JMS program was approved by Cost Assessment and Program Evaluation (CAPE) on April 11, 2013. The Increment 2 Milestone B ADM was signed by the Milestone Decision Authority on June 18, 2013.

Firm, Fixed-Price Feasibility: When making the selection of contract type to execute Increment 2, the Program Manager has chosen a combination of fixed-price and cost-type contracts consistent with the level of cost risk associated with the effort.

Independent Cost Estimate: The program has not experienced a Critical Change, which would induce the independent cost estimate required by 10 U.S.C. 2334(a)(6). An Increment 2 Program Office Estimate has been produced and an Air Force Cost Analysis Agency-approved Service Cost Position, dated April 2, 2013, was reviewed by CAPE as part of an independent cost assessment in support of the Increment 2 Milestone B decision.

Business Case Certification:

Name:	Mr. David W. Madden
Organization:	Air Force/PEO/Space for JMS Inc 2
CAC Subject:	CN=MADDEN.DAVID.WALTER.1010304152,OU=USAF,OU=PKI,OU=DOD,O=U.S. GOVERNMENT,C=US
Date:	3/10/2014 06:17 PM

Business Case Changes

There has been no significant change to the Business Case since it was last certified.

Certification of Business Case Alignment; Explanation:
I certify that all technical and business requirements have been reviewed and validated to ensure alignment with the business case. This certification is based on my review of the JMS Capability Development Document dated December 10, 2010 (JROCM 189-10).

Program Status

Annual Report: The program expects to meet performance thresholds but has experienced schedule delays. Concurrency between Service Pack 9 testing and Service Pack 11 integration continues to drive a highly aggressive schedule. High risk areas are being identified and a revised schedule is in work to ensure the program can be fully executed.

Significant Change: The Milestone C date has slipped from September 2016 to December 2016 and FDD has slipped from October 2016 to March 2017 since the last MAIS Annual Report. Additional time was added to accommodate completion of integration efforts and additional testing due to deficiencies discovered in Service Pack 9 contractor testing. This added test time, in combination with funding reductions and the US Government furlough and shutdown in FY13, caused a total FDD slip of nine months from the original estimate of June 2016. The added test time for Service Pack 9 has also increased concurrency between Service Pack 9 and Service Pack 11, increasing overall schedule risk. The program office is currently assessing the schedule to determine if FDD will slip beyond June 2017, causing a schedule critical change.

Schedule

Schedule Events		
Events	**Original Estimate Objective**	**Current Estimate (Or Actual)**
MDD	Dec 2011	Dec 2011
Milestone A[1]	N/A	N/A
Preferred Alternative Selected[2]	Dec 2011	Dec 2011
Milestone B	Jun 2013	Jun 2013
Milestone C[3]	Mar 2016	Dec 2016
FDD[3]	Jun 2016	Mar 2017
FD	TBD	TBD

Memo

1/ The December 19, 2011, ADM approved the MDD and directed that program initiation for JMS Increment 2 occur at Milestone B. Therefore, the program does not have a Milestone A.

2/ The Preferred Alternative Selected starts the five-year development clock and was established by the December 19, 2011, ADM.

3/ The current estimate for Milestone C has changed from September 2016 to December 2016 and FDD has changed from October 2016 to March 2017 due to technical issues during Service Pack 9 integration that drove additional test/fix time and concurrency between Service Packs.

Acronyms and Abbreviations

FD - Full Deployment
FDD - Full Deployment Decision

Performance

Performance Characteristics		
Original Estimate Objective/Threshold		**Current Estimate (Or Actual)**
KPP #2 - Provide High Accuracy Space Object Positional Information		
The System shall: Perform high-accuracy trajectory/orbit determination for all identified Resident Space Objects (RSOs) in space and in Earth orbit utilizing data from the Space Surveillance Network (SSN), cooperative government sensors, and data from SSA Data Sharing Agreement partners. Enable the user to determine the utility (e.g., quality, accuracy or value) of externally-provided orbital parameters. Produce, maintain, and provide high-accuracy propagation and ephemeris for identified objects in earth-centered trajectory/orbit (including parabolic/hyperbolic orbits). Accepted externally-provided orbital parameters (in earth-centered reference frame) and ephemeris (including for powered-flight/maneuver, high specific impulse (ISP) continuous maneuver, and interplanetary trajectories at a minimum), and enable their use in all system processes, including subsequent data dissemination and exposure. Provide the capability to compare orbital parameters and ephemeris for the same object to determine relative positional differences (and accuracy, if one set can be assumed to more accurately represent the truth position). Provide the capability to convert orbital parameters and ephemeris from one coordinate system and vector type to another to support data exposure via the UDOP (including fitting two-line element set to propagated ephemeris) and in user-selectable formats via legacy and net-centric means to include state vectors, two-line elements sets, and specific consumer-defined formats. Store and process a minimum of 100,000 RSOs, with the capability to scale upward. The system shall meet or exceed current system capabilities in any solar environment. For a benign solar environment, 68% of the calculated positional accuracy at 18 hours from epoch will be: (see classified Table 2-1 Positional Accuracy).	Threshold = Objective. The System shall: Perform high-accuracy trajectory/orbit determination for all identified Resident Space Objects (RSOs) in space and in Earth orbit utilizing data from the Space Surveillance Network (SSN), cooperative government sensors, and data from SSA Data Sharing Agreement partners. Enable the user to determine the utility (e.g., quality, accuracy or value) of externally-provided orbital parameters. Produce, maintain, and provide high-accuracy propagation and ephemeris for identified objects in earth-centered trajectory/orbit (including parabolic/hyperbolic orbits). Accepted externally-provided orbital parameters (in earth-centered reference frame) and ephemeris (including for powered-flight/maneuver, high specific impulse (ISP) continuous maneuver, and interplanetary trajectories at a minimum), and enable their use in all system processes, including subsequent data dissemination and exposure. Provide the capability to compare orbital parameters and ephemeris for the same object to determine relative positional differences (and accuracy, if one set can be assumed to more accurately represent the truth position). Provide the capability to convert orbital parameters and ephemeris from one coordinate system and vector type to another to support data exposure via the UDOP (including fitting two-line element set to propagated ephemeris) and in user-selectable formats via legacy and net-centric means to include state vectors, two-line elements sets, and specific consumer-defined formats. Store and process a minimum of 100,000 RSOs, with the capability to scale upward. The system shall meet or exceed current system capabilities in any solar environment. For a benign solar environment, 68% of the calculated positional accuracy at 18 hours from epoch will be: (see classified Table 2-1 Positional Accuracy).	Will Meet Threshold
KPP #3 - Predict & Report Orbital Conjunctions		
The System shall: Correctly identify and report orbital conjunctions of user-specified systems from	Threshold = Objective. The System shall: Correctly identify and report orbital conjunctions of user-	Will Meet Threshold

pre-launch screening through end of life operations. Objects subject to conjunction analysis shall include manmade objects and INOs (e.g., asteroids, comets) of interest. Data supporting the conjunction analysis and other reports shall be presented to user via the UDOP. Permit the user to define a conjunction assessment request and filter reports based on one or more available object conjunction attributes (e.g., specific satellite[s], constellation[s], orbital altitude[s], inclination[s], time, miss distance, probability of collision, size of conjuncting objects, and a user-specified volume). Note: Includes one-on-one, one-on-all, list (1-to-N)-on-list (1-to-N), and all-on-all conjunction assessments. Allow the user to perform manual conjunction assessment including using externally provided ephemeris files that support maneuver planning. Determine probability of collision for each analysis to meet or exceed the results derived from HQ AFSPC/A3 Astrodynamic Standards as applied to the current capability. Screen a RSO following a state vector update, or at least every 24 hours, forecasting a five-day conjunction screening. The system shall screen a space catalog of 100,000 RSOs, or current catalog size (whichever is greater), in less than three hours.	specified systems from pre-launch screening through end of life operations. Objects subject to conjunction analysis shall include manmade objects and INOs (e.g., asteroids, comets) of interest. Data supporting the conjunction analysis and other reports shall be presented to user via the UDOP. Permit the user to define a conjunction assessment request and filter reports based on one or more available object conjunction attributes (e.g., specific satellite[s], constellation[s], orbital altitude[s], inclination[s], time, miss distance, probability of collision, size of conjuncting objects, and a user-specified volume). Note: Includes one-on-one, one-on-all, list (1-to-N)-on-list (1-to-N), and all-on-all conjunction assessments. Allow the user to perform manual conjunction assessment including using externally provided ephemeris files that support maneuver planning. Determine probability of collision for each analysis to meet or exceed the results derived from HQ AFSPC/A3 Astrodynamic Standards as applied to the current capability. Screen a RSO following a state vector update, or at least every 24 hours, forecasting a five-day conjunction screening. The system shall screen a space catalog of 100,000 RSOs, or current catalog size (whichever is greater), in less than three hours.	
KPP #4 – Operational Availability		
The operational availability (Ao) of the system to perform Critical Operational Functions shall be ≥ 99.5% measured over every running 365 day period with no single outage greater than two minutes. The Ao applies to Critical Operational Functions: provide authoritative data source of high accuracy space object positional information, produce orbital conjunction, SSA event processing, threat identification and notification, UDOP, Space Order Battle (SOB)/Asset characterization, monitor force and resource status, monitor events, and provide space environmental effects assessment and forecasts.	Threshold = Objective. The operational availability (Ao) of the system to perform Critical Operational Functions shall be ≥ 99.5% measured over every running 365 day period with no single outage greater than two minutes. The Ao applies to Critical Operational Functions: provide authoritative data source of high accuracy space object positional information, produce orbital conjunction, SSA event processing, threat identification and notification, UDOP, Space Order Battle (SOB)/Asset characterization, monitor force and resource status, monitor events, and provide space environmental effects assessment and forecasts.	Will Meet Threshold

Memo

Joint Requirements Oversight Council Memorandum 112-12, dated August 1, 2012 and re-validated in Joint Requirements Oversight Council Memorandum 080-15, dated July 30, 2015, identified KPPs 2, 3, and 4 to be applicable to JMS increment 2. KPPs 1 and 5 were identified to be applicable to JMS increment 1 and, therefore, are not included in this annual report.

Acronyms and Abbreviations

Ao - Operational Availability
HQ AFSPC/A3 - Headquarters Air Force Space Command Air and Space Operations
INO - Interplanetary Natural Objects
ISP - Specific Impulse
RSO - Resident Space Object
SOB - Space Order of Battle
SSA - Space Situational Awareness
SSN - Space Surveillance Network
UDOP - User Defined Operational Picture

Cost

JMS Inc 2				
Appropriation Category	BY 2012 $M		TY $M	
	Original Estimate	Current Estimate Or Actual	Original Estimate	Current Estimate Or Actual
Acquisition Cost				
RDT&E	298.2	350.7	312.7	366.4
Procurement	0.0	0.0	0.0	0.0
MILCON	0.0	0.0	0.0	0.0
Acq O&M	0.0	0.0	0.0	0.0
Total Acquisition Cost	298.2	350.7	312.7	366.4
Operating and Support (O&S) Cost				
Total Operating and Support (O&S) Cost	606.5	606.5	787.8	802.1
Total Life-Cycle Cost				
Total Life-Cycle Cost	904.7	957.2	1100.5	1168.5

Cost Notes

1. This report and the Budget Year IT-1 Exhibit cover different time periods thus the costs will not match.
2. Then Year dollars are included for information purposes only; cost variances will be reported against Base Year dollars.
3. The O&S costs reflect all work performed during that phase, regardless of the type or source of funding.
4. $48.0M in FY 2017 RDT&E funding was moved from JMS Inc 3 to JMS Inc 2 due to Inc 2 schedule slip.
5. The FY 2014 RDT&E budget was a combination of JMS Inc 1 and Inc 2. The $52.7M shown in this report for FY 2014 is for Inc 2 only.